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[54] **DOOR HOLD OPEN ATTACHMENT FOR A DOOR CHECK**

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[51] **Int. Cl.** **E05f 15/20**

[58] **Field of Search** 16/48.5, 49, 51, 52, 55, 16/62; 251/141, 138, 140

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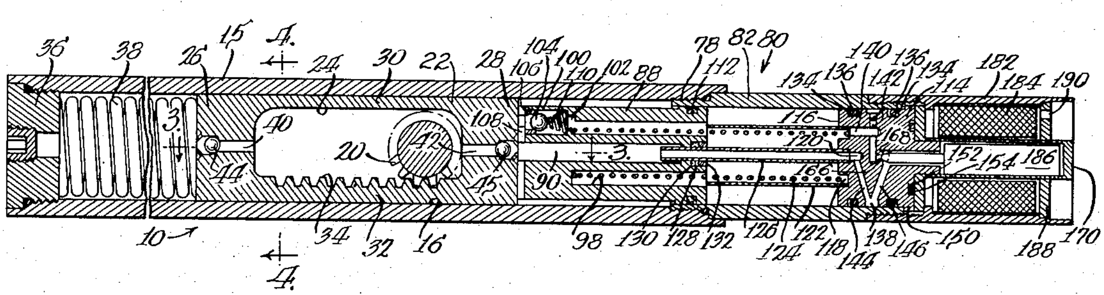
[57] **ABSTRACT**

An attachment for a conventional, surface mounted, overhead door control incorporating electrically actuated provision for holding the door open to any desired degree, but defeatable by manual pressure or by deenergization of the electric circuitry.

9 Claims, 6 Drawing Figures



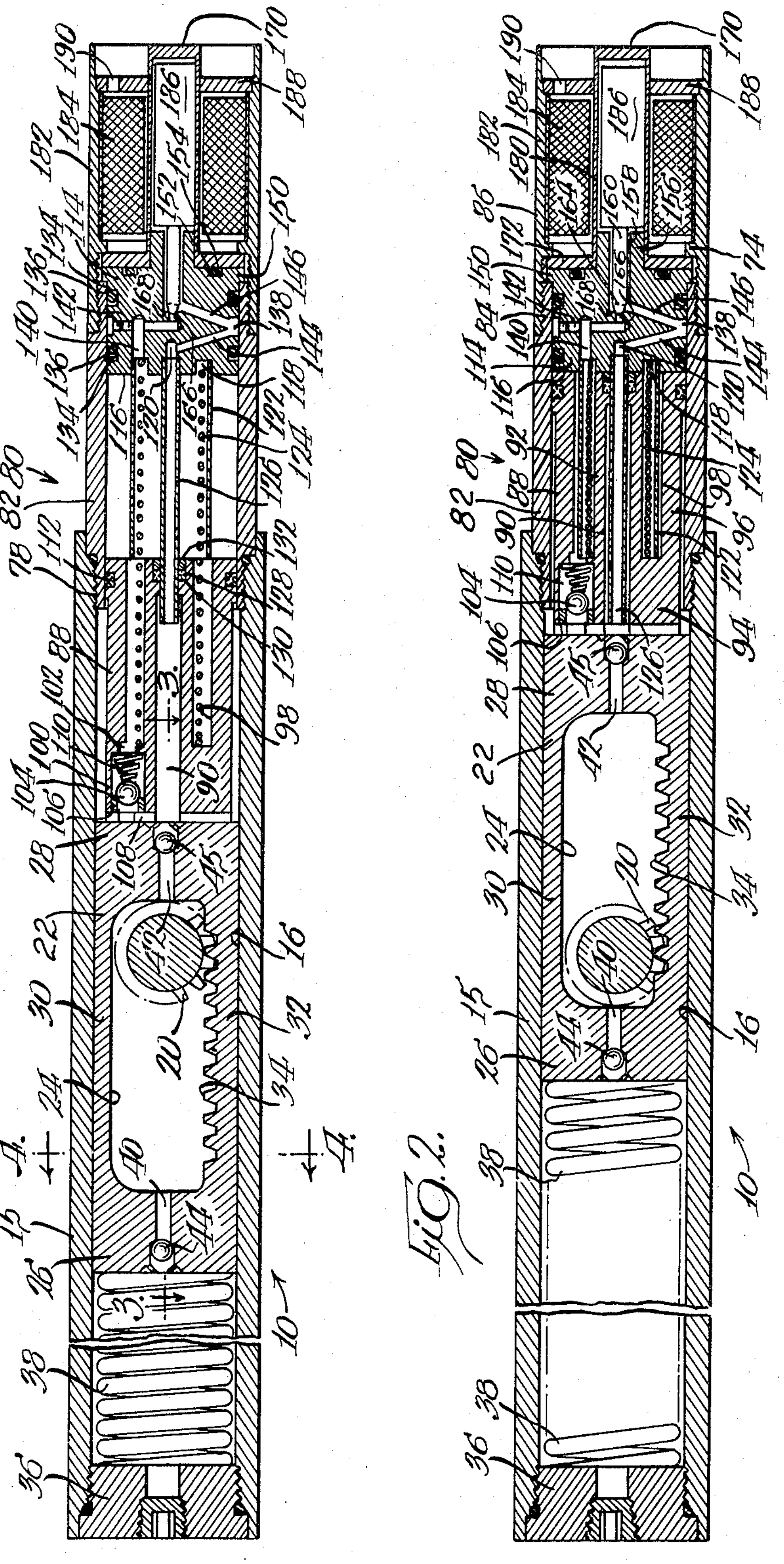


FIG. 1.

FIG. 2.

Fig. 3.

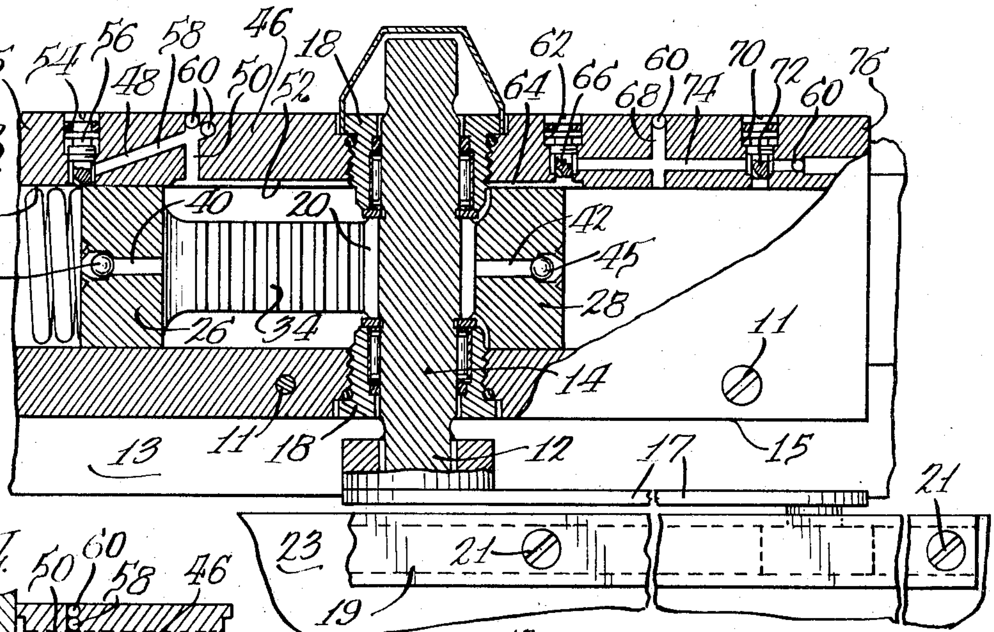


Fig. 4.

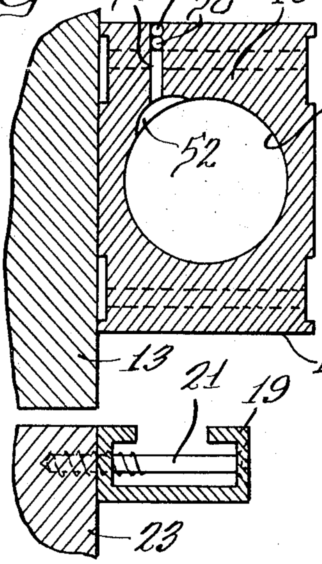


Fig. 5.

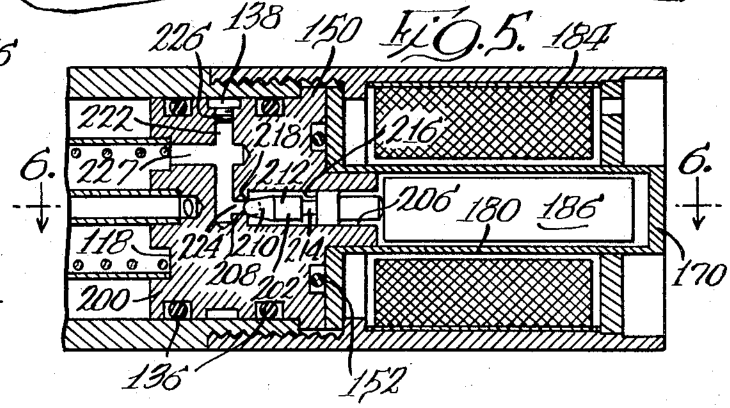
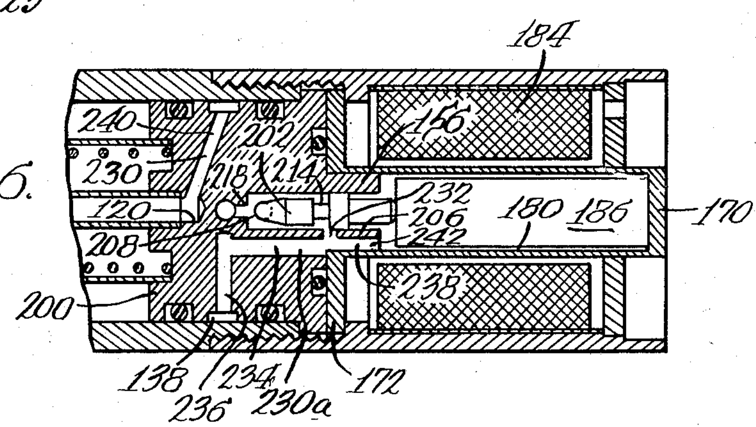


Fig. 6.



DOOR HOLD OPEN ATTACHMENT FOR A DOOR CHECK

SUMMARY OF THE INVENTION

In application Ser. No. 105,331, filed Jan. 11, 1971, of Paul W. Martin for a "COMBINED DOOR CHECKING AND DOOR HOLD OPEN MECHANISM," there is shown a surface mounted door check unit of the type wherein arcuate movement of an arm rotates a pinion meshed with a rack carried by a piston. Rack movement compresses a spring upon door opening, and the return thrust of the spring closes the door. The closing movement of the door is restrained by the presence of hydraulic fluid ahead of the piston in its closing direction of travel which must escape through a metered orifice and return to the back side of the piston. The inventive feature of that application was the introduction of an electrically controlled valve in the escape passage of the hydraulic fluid which, when energized, blocked the passage and thus effectively prevented the further travel of the piston in the closing direction.

In surface mounted door closers of the type shown in the Martin application, it is conventional to provide two ports in the cylinder wall in the direction of travel of the piston in the closing direction and one port in the opening direction for the metered restraint on the piston, to or past which the piston must move. For the Martin device to operate effectively, the piston must make a fluid tight seal with the wall of the cylinder, thus demanding ring seals. As the sealing rings come to or pass the open ports, they necessarily will bulge into the ports, and as they return to the continuous wall portion, they stand a good chance of being scuffed or nibbled off. The sealing is not essential in the absence of the door hold-open provision of the Martin application, or in the other words, where the closer is to function simply as a door check, but it is needed where a fluid must be positively held ahead of the piston.

The device of the present invention contemplates a displacement of the door holding mechanism entirely away from the area of the fluid escape ports such that no sealing of the rack piston is necessary, and the movable member of the holding mechanism is not called on to pass any ports.

The device of the present invention contemplates a wholly enclosed valve operating armature such that no packing gland and no possibility of oil drip occurs at the site of the door holding valve.

The device of the present invention can be employed strictly as an accessory or an attachment to a standard door closer such that the standard closer may be modified simply by substituting the door holding mechanism for the conventional end plug with no further modification necessary. The door holding mechanism constitutes an axial extension of the door check and lies wholly within the longitudinal projection of the walls of the door check such that no mounting change need be made in the check upon incorporation of the door holding mechanism, and paneling or fairing may be employed to provide a surface continuous with that of the check proper.

Finally, the device of the Martin application shows a door hold-open mechanism which can be overpowered by manual pressure on the door wherein the door will stand open at the point where the overpowering force is released. The device of the present invention contemplates an optional structure where, upon the application of overpowering pressure even momentarily, the detention of the door is released and the door swings to closure.

Other objects and features of this invention will be apparent from the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a horizontal section through a representative door check incorporating the device of the present invention, shown in its condition when the door it controls is fully open;

FIG. 2 is a similar section shown with the parts thereof in the door-closed position;

FIG. 3 is a fragmentary vertical section through the central portion of the check taken substantially along the line 3—3 of FIG. 1 looking in the direction of the arrows shown, however, without the device of the present invention;

FIG. 4 is a transverse section through the cylinder or housing taken along the line 4—4 of FIG. 1 looking in the direction of the arrows;

FIG. 5 is a vertical section through an optional form of manifold; and

FIG. 6 is a horizontal section through the manifold of FIG. 5 taken along the line 6—6 of FIG. 5 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The left hand portion of FIG. 1 illustrates a conventional door check **10** of the surface mounted type. The door check (FIG. 3) may be mounted by screws **11** to a wall **13** immediately above a doorway with the operating end **12** of a pinion shaft **14** extending downward from the door check housing **15**. An appropriate arm linkage **17** will be clamped at one end to the operating end **12** of the shaft **14** and slidably engaged at its other end in a track **19** secured by screws **21** to the door **23** such that as the door is opened, the pinion shaft **14** will be rotated in one direction and as the door closes, it will be rotated back to the starting position. Such interconnection between the door check and the door is entirely conventional.

The housing **15** is internally longitudinally bored to define a cylinder **16**. The pinion shaft **14** spans the cylinder **16** and is mounted in appropriate pinion bearings **18** with appropriate seals on opposite sides of the cylinder. The pinion shaft has an integral pinion **20** formed thereon within the cylinder **16**. The pinion **20** engages a rack piston **22** within the cylinder. The rack piston may best be regarded as an elongated cylindrical member having a long transverse aperture **24** formed therein to leave cylindrical ends or heads **26** and **28** connected by opposite, longitudinally extending webs **30** and **32**. The inside surface of web **32** has teeth formed thereon to define the rack **34** with which the pinion **20** engages.

The left end of the cylinder **16** as seen in FIGS. **1** and **2** is closed by a plug **36** secured within the open end of the cylinder in fluid-tight relationship, and a door-closing, strong, compression spring **38** is contained between the plug **36** and the left hand head **26** of the rack piston **22**. When the door is closed, the relation of the rack piston and spring is as illustrated in FIG. **2**. Upon opening the door, the pinion is rotated in a clockwise direction, thus advancing the rack piston **22** to the left and compressing the spring **38** (FIG. **1**). When the door is released, the pressure of the spring on the rack piston moves the piston to the right thus rotating the pinion in a counterclockwise direction and through the linkage with the door, draws the door shut.

The rack piston has one way, axial, fluid flow passages **40** and **42** through the heads **26** and **28**, respectively, controlled by ball check valves **44** and **45** to forbid fluid flow from the faces of the rack piston heads into the central slot **24** but to permit flow from the central slot out the ends of the piston.

As particularly illustrated in FIG. **3**, the top wall **43** of the housing is of augmented thickness to accommodate check flow passages. On the left side of the pinion **20**, there is a back check system **48** which retards the movement of the door as it approaches its full open position. It includes a bore **50** extending perpendicularly through the wall **46** and opening into a shallow recess or groove **52** formed in the interior wall of the cylinder **16.** A second perpendicular bore more remote from the pinion **20** likewise extends through the wall **46** which is formed and tapped for the reception of a needle valve **56.** This bore opens into the cylinder at the intended end of travel of the face of the cylindrical portion **26** of the rack piston in the door opening direction. An intersecting bore **58** interconnects the passage **50** and the needle valve seat **54.** The bores **50** and **58** are plugged at their outer ends by plugs **60.**

On the other side of the pinion **20** are the check passages operative as the door closes. Nearest the pinion **20** is a bore **62** extending through the wall **46** into the cylinder and opening into the recess **52** in the interior cylinder wall. The recess extends between and includes the opening ports of bores **50** and **62.** Bore **62** is conformed and tapped for the reception of a rapid close needle valve **66.** A plain bore **68** extends through wall **46** to the right of needle valve **66** and is plugged **60** at its outer end. Still further to the right is a bore **70** formed for the reception of a final, slow-close needle valve **72.** An interconnecting passage **74** is provided in through the end **76** of the cylinder housing **15** to interconnect the bores **62, 68** and **70** and is plugged **60** at its outer end. Needle valve **66** is adjusted to provide a relatively free flow of hydraulic fluid and needle valve **72** to provide a highly restricted flow.

For ease of understanding, the check flow passages and the groove **52** have been shown in FIG. **3** as being situated on the vertical axis of the cylinder **16**, whereas, actually, the passages are offset from the axis and the groove **52** is in the upper left quadrant of the cylinder as shown in FIG. **4** so that the groove **52** avoids the bearing structure **18** of the pinion shaft **14.**

The housing **15** is provided at its righthand end with an internally threaded plug seat **78,** and when the door check is employed solely as a door opening and closing rate controller, such a plug will be emplaced. In the drawings here, the plug has been replaced by the door hold-open mechanism to which this invention is primarily directed, but it is believed important that the operation of the door check itself by understood before embarking on a description of the hold open mechanism. Accordingly, let a simple plug be visualized as occupying the plug seat **78.** The cylinder will be filled with hydraulic fluid.

As the door moves from the illustrated open position of FIG. **1** to the illustrated closed position of FIG. **2** under the force of the closing spring **38,** the rack piston **22** is forced to the right. At the start, the face of the right hand head **28** is approximately aligned with the rapid close needle valve port **62.** As the face of the cylinder advances, the ball check valve **5** closes, compelling fliud flow through the ducts **62, 68, 70** and **74.** Initial flow occurs through both duct **70** and duct **68** into the connecting duct **74,** is restricted in exhaust by the needle valve **66** and bypasses the cylinder head **28** through the groove **52** into the central cavity **24** of the piston whence it escapes through the ball check valve **44** in the left hand piston head **26.** This displacement continues until the head **28** covers the duct **68** whereafter flow occurs only through the tightly restricted needle valve **72.** Movement thus continues at a greatly reduced rate dictated by the needle valve **72** until the door seats. It will be appreciated that although the spacing of ports **68** and **70** appears large, the geometry of the connecting arm is such that this piston travel represents only the last few degrees of the door swing.

In the opening direction, as the piston is moved to the left, the ball check valve **44** in head **26** closes, compelling fluid flow past the head and into the piston cavity **24** through the groove **52** until the head **26** passes the end of the groove and fluid flow must continue through needle valve **54,** and ducts **58** and **50** to the groove **52.** The restraint imposed here is to cushion the linkage as the door approaches its fully open position.

In the present invention, a door hold assembly **80** is threaded into the right hand end plug seat **78** instead of the imagined plug. The door hold assembly **80** includes a tubular shell **82** externally threaded at both its ends, one end being secured within the plug seat **78** and the other end **84** having mounted thereto a tubular solenoid shell **86,** the solenoid shell being internally threaded to cooperate with the external threads at the end **84.** The shell **82** slidably contains a double walled, annular, cup-shaped, door hold piston **88** having an axial through passage **90,** an inner wall **92,** a base **94** confronting the rack piston **22** and an outer wall **96,** all of which define therewithin an annular cavity **98.** The base **94** of the piston has a bore **100** through the bottom thereof stepping to a smaller diameter as at **102** which communicates with the annular cavity **98.** A check valve ball **104** is contained in the bore **100** between a ball check valve seat **106** press-fitted into the end of the bore and retained by ball check valve seat retainer **108,** and a spring **110** biasing the check valve ball toward closure. The piston is sealed against the inside wall of the shell **82** by a quad ring seal **112** contained in an appropriate circumferential groove in the outside surface of the piston adjacent its open end.

A cylindrical manifold **114** is contained within the outer end of the shell **82.** Its inside face **116** has an annular groove **118** and an axial bore **120** extending only a short distance into the manifold. The groove **118** has a sleeve **122** press-fitted into the outer circumference thereof which extends deep into the annular cavity **98** in the door hold piston **88** when the piston is in its door closed position as shown in FIG. **2,** and barely emerges from the annular cavity when the piston is in its extreme door open position as shown in FIG. **1.** The sleeve acts as a container and external guide for a light follower spring **124** which is contained under compression within and against the bottom of the annular cavity **98** of the piston and the annular groove **118** of the manifold. The spring is light in comparison with the door closing spring 38 such that it exerts no perceptible effect on the door closing operation but ensures that the piston 88 will follow the rack piston 22 in its movement. The diameter of the sleeve 122 is appreciably less than the outside wall of the cavity 98 such that fluid may freely pass between the sleeve and that wall.

The axial bore 120 has a fluid return sleeve 126 press-fitted into it to extend into the axial passage 90 of the piston 88 in fluid tight relationship. The seal is effected by a quad ring seal 128 contained in an enlargement 130 of the passage 90 at its end remote from the rack piston and secured therein by a backup 132. The length of the sleeve 126 is such as to maintain its fluid-tight communicating relationship with the passage 90 throughout the range of movement of the piston 88.

The manifold has three annular grooves in the cylindrical periphery thereof, two of them 134, for sealing rings 136 and a central manifold groove 138 serving as a departure point for forming certain internal passages. Reverting for the moment to the inside face 116 of the manifold, a blind hole 140 extends longitudinally into the manifold from the spring seat groove 118. A radial intersecting bore 142 is formed from the groove 138 through the inside end of the bore 140 to the center of the manifold. The axial fluid return bore 120 stops short of the position occupied by bore 142 so as to isolate these bores from each other. A passage 144 angles inwardly from the groove 138 to intersect the inside end of the axial bore 120. A second passage 146 angles outwardly from the groove 138 toward the center line of the manifold. Although passages 144 and 146 are shown intersecting for reasons of clarity, the groove 138 makes possible different points of entry of those passages thereinto. Adjacent its outer face 148, the manifold has a circumferential rib 150 thereabout.

The outer face 148 of the manifold has an annular groove 152 therein to receive a sealing ring 154, and inwardly of the groove, an annular nipple 156. Centered in the nipple is an axial plunger chamber 158 proportioned to accommodate loosely a plunger 160. The plunger is a generally cylindrical body a little longer than the chamber 158 with a tapering inner end 162 socketed to accommodate a valve ball 164. Extending axially from the bottom of the plunger chamber 158 is a bore 166 which intersects bore 142. The shoulder 168 at which bore 166 meets the floor of the plunger chamber 158 constitutes a seat for the ball 164.

A solenoid cap 170 consisting of a one piece, deeply drawn cup or thimble with a flange 172 about its mouth is contained against the outer face 148 of the manifold. The interior of the cup fits closely on the nipple 156 of the manifold and the flange 172 thereof is of the same diameter as the flanged outer face of the manifold. The interior of the solenoid shell 86 has a rib 174 thereabout, and as the solenoid shell is threaded on the outer end of the piston shell 82, the rib 150 of the manifold and the flange 172 of the cup are caught between the end 176 of the solenoid shell 82 and the rib 174 to make, with the sealing rings 154 and 136, a fluid-tight end for the assembly.

In the annular space between the wall 180 of the cup and the outward extension 182 of the solenoid shell 80 is located a solenoid winding 184, and an armature 186 is situated within the cup in a position to be moved upon energization of the solenoid winding. The solenoid winding is contained in position by an annular solenoid cover 188 having a hole 190 therein for the solenoid leads.

The operation of this device is as follows. Assuming that the door is in closed position and the combined door check and door hold-open mechanism is as shown in FIG. 2 and is to be moved to the condition shown in FIG. 1, the rack piston 22 moves to the left as described before, discharging fluid into the vacated space behind it through the ball valve 44 in the piston head 28. The door hold piston 88 will follow the rack piston in its movement under influence of the spring 124, the ball check valve 104 yielding to admit fluid therethrough into the annular cavity 98 and thence around the loose fitting sleeve 122 into the space vacated by the door hold piston 88.

Assuming now movement of the door from the open position to the closed position or from the condition of FIG. 1 to that of FIG. 2, the spring 38 expands moving the rack piston to the right which in turn forces the door hold piston to the right before it against the force of the spring 124. The ball check valve 104 closes and the fluid contained to the right of the door hold piston is forced around the spring retainer sleeve 122 into the space occupied by the follower spring 124 and into the passages 140, 142, and 166 to the solenoid valve seat 168. If the solenoid is deenergized, the solenoid valve ball 164 is displaced from the seat by fluid pressure, and fluid flow continues through passages 146 and 144 to the fluid return sleeve 126, through the door hold piston, and to the advancing face of the head 28 of the rack piston 22. Thereafter, the fluid bypasses that head as described in conjunction with the door check mechanism proper.

Energization of the solenoid 184 will cause the armature to bear on the plunger 160 to hold the ball 164 against its seat and so prevent the passage of the hydrualic fluid from the right side of the door hold piston and thus maintain the door in an open position. Even when the plunger is closed on the seat 168, it holds the armature away from the center of the solenoid field, so positive closing force exists. It will be appreciated that the door need not be open to a fully open position for this retention to be effective. If the solenoid 184 is energized, the door will hold at any partially open degree to which it may have been moved.

The force with which the door is held open is measured by the magnetic thrust of the armature 186 acting on the valve ball 164 against its seat. Desirably the solenoid will be so selected that this force will be specifically limited. In other words, it is desirable that the solenoid be capable of being manually overpowered. When the necessary excess of pressure is applied to the door to close it, the generation of excess pressure within the chamber to the right of the door hold piston and within the space occupied by the spring 124 and transmitted to the ball 164 through the passages 140, 142 and 166 will lift the plunger 160 off its seat and thus permit fluid flow past the valve in the fashion just described to permit a manual closing of the door.

The above described advantages of this structure will be appreciated from the description of the device thus far. The rack piston 22 which operates in the area of the fluid escape ports by which the rate of closure is governed has not and need not have anything in the way of deformable sealing rings which might be damaged by their passage to and through the ports. The door holding structure which does demand such rings is wholly displaced from the area of these ports and can operate within a continuous, smooth, cylinder surface. Likewise, there is a total avoidance of any exterior sealing of moving parts such as about the solenoid controlled valve **160** through which leakage and drip might occur. It will be noted that the valve plunger **160** and the armature **186** fit relatively loosely within their associated containers. Hydraulic fluid may and will leak past the valve member **160** and the armature **186** into the cup **170**, but such presence of fluid is wholly contained by static seals.

The door holding device is accessory in nature and may be incorporated into an existing closure simply by removing an end plug and substituting the device for it. The device lies within the longitudinally projected walls of the door check proper and lends itself to a masking by panels continuous with the side walls of the door check such that the only visible decorative consequence of its incorporation is an elongation of the unit.

In the device as just described, it will be appreciated that while the solenoid controlled ball valve can be overpowered to permit a forced closing of the door, once the application of overpowering force is halted, the ball valve will reclose and further movement of the door will stop. In the modification illustrated in FIGS. **5** and **6**, a manual release valving arrangement is shown whereby, once the valve is displaced from its seat by overpowering pressure, the valve will hold open until the door goes fully closed. The manifold **200** is very similar in exterior contour to the manifold **114** of the first described form. Thus, it possesses an annular groove **118** in its inside face to receive the sleeve **122** and an axial blind bore **120** to receive the fluid return sleeve **126**. On its cylindrical periphery it has the two sealing grooves **134** the central manifolding groove **138** and, at its outer face, the shoulder **150** to be clamped between the end of piston shell **82** and the flange **172** of the cup **170** by the solenoid shell **86**. In its outer face, it has the annular sealing groove **152** and the tubular nipple **156** in which the plunger chamber **206** is formed. To this extent the two manifolds are essentially identical.

The points of difference between this manifold and the first described form lie essentially in the use of a different valve body or plunger **202** and a differently situated exhaust port **204** from the plunger chamber **206**.

In this instance the plunger **202** mounts a valve check ball **208**, as before, at its tapered inner end **210** which diverges to a cylindrical portion **212** which stands well clear of the walls of the valve chamber **206** so as to permit a free flow of fluid therepast. Outwardly of the portion **212** the plunger is necked down as at **214** and then expands again to a plunger head **216** which fits as closely within the walls of the plunger chamber as conventional machining practices conveniently permit and extends outwardly at this diameter to the outer end which is engaged by the solenoid armature **186**.

The admission of oil from the space back of the door hold piston **94** to the ball valve seat **218** is as described before. A bore **220** extends from the annular groove **118** to intersect a radial bore **222** extending from the manifold groove **138** through the center of the manifold **200** which in turn is intersected by a small diameter bore **224** extending from the plunger chamber **206** to the radial bore **222**. The radial bore **222** is plugged outwardly of bore **220** as at **226**. These passages may be collectively referred to as the inlet passage **227** to the solenoid valve.

The exhaust passage **230, 230**a differs from the first described form. The immediate point of exhaust from the ball valve plunger chamber, instead of being situated immediately adjacent the ball valve seat **218**, is displaced substantially outwardly of the ball valve seat in reference to the axial length of the plunger chamber as at bore **232** in the side wall thereof. This outward displacement is such that when the ball **208** of the plunger **202** is seated against the ball seat **218**, the plunger head **216** will cover the exhaust port **232**. A bore **234** extends parallel to the axis of the manifold **200**, intersecting the exhaust port **232** and going to a point radially aligned with the manifold groove **138**. A hole **236** extends radially from the groove to intersect the bore **234**. Thus a passage is completed to the manifold groove **138** through **236, 234** and the exhaust port **232**. The bore **232** at its outer end forms only a groove **238** in the wall of the nipple **156**, but the side wall **180** and flange **172** of the cup **170** enclose the groove to make a closed passage of it.

At another point in the manifold groove **138**, here shown to be opposite, another bore **240** extends from the ring to the central fluid return tube **126** to constitute the leg **230** of the fluid exhaust passage, as in the principal described form.

Parenthetically, it should be noted that FIGS. **5** and **6** show two planes through the manifold whereas FIGS. **1** and **2** show only a single plane in order to make more clear the relationship of the parts. Actually, the fluid inlet **140, 132, 166** and the two legs **146** and **144** of the fluid outlet need not all be situated in the same plane as shown in FIGS. **1** and **2**. Thus, the passage **144** of FIGS. **1** and **2** could occupy the same diametrically opposite position from leg **146** as the passage **240** of the presently described form occupies from the passage **236**, communication occurring through the manifold groove and the inlet passage **140, 142, 166**, or be situated at right angles to both of these. It is entirely a matter of convenience of machining.

The operation of this alternative form of manifold is as follows. Assuming the door hold-open piston is in the open door position as illustrated in FIG. **1** with a quantity of fluid contained in the cavity behind it communicating through the solenoid valve inlet duct **227** to the valve seat **218**, and the solenoid **184** is energized, the door will be held open by virtue of the obstructed flow through the valve seat **218**. As manual pressure is now applied to the door in the closing direction sufficient to overcome the thrust of the solenoid armature **186**, the ball is displaced from the seat **218** and the pressure of the fluid as generated by the closing spring **38** will be applied against the entire face of the plunger including the head **216**. Since the force is now acting on a greatly increased surface, the counter pressure exerted by the fluid against the solenoid armature will be greatly augmented. The proportioning of the solenoid thrust, the return spring pressure, and the whole face surface of the plunger head **216** is such that the pressure of the spring **38** acting on the plunger face is sufficient to continue the overpowering of the solenoid armature thrust. Thus, the plunger will move in the opening or displaced direction, i.e., to the right, until the head **216** uncovers the exhaust port **232** to a sufficient degree to permit the escape of fluid through the exhaust system **230, 230***a* until the door has reached full closure. At this point, the pressure on the plunger drops and the force of the solenoid armature is again sufficient to restore the ball to closure on the seat **218**. In summary, therefore, with the solenoid energized, as one opens the door, the movement is easy and the door remains at the position to which it was opened. Upon the application, then, of excess closing force to the door through just enough arc to unseat the ball **208** from its seat **218**, the door will swing to closure without further application of force.

Since the plunger **202** fits the chamber **206** in near fluid-tight relationship in this modification, means must be provided for supplying fluid to or exhausting fluid from the outer end of the plunger as contained in the cap **170**. That part **242** of groove **238** outwardly of the plunger chamber exhaust port **232**, walled in by the cap **170** is in open communication with the interior of the cap, connecting it to the zero pressure exhaust side of the solenoid valve, so fluid is free to move back and forth. The armature in this embodiment is loose within the cap as in the first described form.

It is not essential that the plunger **202** be fluid-tight within the chamber since the back side of the plunger is at zero pressure as long as the fit is close enough to hold the leakage level well below the input capacity of the inlet system to and through the solenoid valve. Given the viscosity of the hydraulic fluid, this is easily achieved by simple machining, and so again, sealing rings are avoided.

I claim:

1. In a door check of the type which includes means defining a cylinder, a member slidable within said cylinder, resilient means biasing said member toward one end of said cylinder, means for connecting said door check to a door and frame combination to move said member relative to said cylinder against said biasing means upon opening said door, hydraulic fluid in said cylinder and means for permitting fluid flow counter to the movement of said member to restrain the movement of said door; a door hold-open mechanism comprising means providing an extension of said cylinder on that end thereof toward which said member is biased, a piston resiliently biased within said extension to follow said member and having a one way flow passage therein to admit fluid therethrough upon following movement against said resilient means, means closing said extension, said closing means including a passage having a valve seat therein for delivering fluid from the downstream side of said one way flow passage to the upstream side thereof, a valve for closing against said valve seat, and electrically actuated means for operating said valve.

2. The combination of claim **1** wherein said valve closes against said seat from the downstream side thereof.

3. The combination of claim **1** wherein said valve is energized with sufficient force to close against the pressure imposed by said resilient means but insufficient force to hold against a pressure in excess of that of said resilient means.

4. The combination of claim **2** wherein said valve is energized with sufficient force to close against the pressure imposed by said resilient means but insufficient force to hold against a pressure in excess of that of said resilient means.

5. The combination of claim **1** wherein said resilient means establishes a pressure on the fluid between said piston and said closing means, said valve has a face larger than said seat and said fluid delivery passage includes a valve chamber on the downstream side of said valve seat containing closely said valve, and said electrically actuated means is adapted to urge said valve against said seat with a force greater than the product of the pressure of said resilient means and the area of said valve seat and less than the product of the pressure of said resilient means and said valve face.

6. The combination of claim **1** wherein said valve is an elongated assembly having a face adapted to close on said seat and including additionally a thimble mounted in fluid-tight relationship to said cylinder defining means and containing the end of said valve assembly remote from said face, and magnetic valve operating means on the exterior of said thimble.

7. The combination of claim **1** wherein said fluid delivery passage includes a tube mounted in said closing means and extending through said piston throughout the range of movement thereof.

8. A combined door check and door hold open device including resilient means for urging

a door toward closure upon expansion thereof, means defining a hydraulic cylinder, a piston therein connected to move toward

one end of said cylinder with the expansion of said resilient means, said resilient means establishing a pressure per unit

area on fluid ahead of said piston, means associated with said one end of said cylinder defining a passage for the escape of fluid from said one end having a valve seat therein, a valve adapted to close against said valve seat from the downstream

side thereof, said valve having a face larger than said valve seat, a valve chamber downstream of said seat, a portion of said valve downstream of said face closely contained in said chamber to substantially prevent fluid flow past said valve

and allow a pressure drop across said valve when said valve is open, means providing a fluid escape passage opening into said valve chamber upstream of said valve face at an open position of said valve, means providing a fluid escape passage from said valve chamber behind said closely contained portion of said valve when in said open position, and means adapted to hold said valve resiliently against said seat with a force in excess of the product of said pressure and said valve seat area and less than the product of said pressure and said face area.

9. The combination of claim **8** wherein said means for resiliently holding said valve are electrically operated.

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